Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 90 of the	)	WT Docket No. 01-146
Commission's Rules and Policies for	)	RM-9966
Applications and Licensing of Low Power	)	
Operations in the Private Land Mobile	)	
Radio 450-470 MHz Band	)	

Comments of Pacific Crest Corporation

Pacific Crest Corporation, a leading manufacturer of radio communication equipment used with Real-Time-Kinematic ("RTK") technology, by its counsel, hereby submits these comments to the Notice of Proposed Rulemaking in the above-captioned proceeding which proposes new regulations to recognize the diversity of low power operations in the 450-470 MHz band. With some changes, as discussed below, Pacific Crest supports the Commission's proposals and applauds the Commission's willingness to take a flexible approach to low power use of the 450-470 MHz band.

Background

RTK technology is used in support of precision Global Positioning Systems ("GPS") for applications such as surveying and machine control. GPS accuracy is limited by various sources of error. At one time (in part due to intentional inaccuracy introduced by the Department of Defense to protect military assets), civilian accessible position information was accurate only to approximately 100 meters. To increase accuracy, Differential GPS ("DGPS") techniques were implemented. Using DGPS, a GPS reference station monitors the satellite signal errors relative to its known location, and transmits correction information to mobile or portable GPS receivers. Over time the use of GPS technology evolved to the point of allowing real-time operation with improved accuracy using signal carrier phase measurement. Extending DGPS messages to include the carrier phase correction factors yielded accuracy approaching two centimeters. These techniques for improving the accuracy of GPS are known as RTK technology and have been widely adopted in order to achieve an accurate, reliable and cost effective substitute for previous surveying, positioning and machine control technologies.

The Nature of RTK Transmissions

On a typical surveying project, a mobile base station receives GPS data, performs RTK corrections and transmits the correction data to mobile GPS units (rovers). This provides the location of each mobile unit to be determined with pinpoint accuracy. The base station and rovers can easily be moved from site to site. RTK provides real-time analysis. Therefore, while a data transmission does not have to be continuous, it must last for the duration of the particular surveying or positioning activity.

At the present time, only two frequencies are available on an uncoordinated, itinerant basis to RTK systems in the 450-470 MHz band.[1] RTK correction information transmissions take place at a rate of once per second with a transmit duty cycle of 30% to 70% depending on the number of GPS satellites in view and the characteristics of the communication equipment. The radio systems operate on a secondary basis to voice, and observe both station identification and Carrier Sense Multiple Access ("CSMA") techniques to reduce co-channel user conflicts. RF power output is from 2 watts to 35 watts, depending on the distance of the rover from the base station. The systems are most commonly operated in the simplex mode, one-way (base transmit, mobile/portable receive-only), but may employ two-way communication to limit interference through power control. The systems are portable, with the base station frequently set up for operation on a daily basis in proximity to the work site.

The correctional transmission typically operates in a 25 kHz bandwidth channel, with a data throughput of 19.2 Kbps per second. However, RTK and radio system manufacturers continue to improve efficiency through data compression and advanced modulation techniques and such modifications will permit the RTK systems to make use of a 12.5 kHz bandwidth channel.

The Growing Use of RTK Technology

The limited market data available for these emerging applications indicate that there are approximately 17,000 RTK systems currently in operation in the United States.[2] Professional land surveyors working under contract on public and private projects operate the majority of these systems. Figure 1 illustrates the historical and projected number of RTK systems from 1996 through 2004. Over the next four years, the number of RTK systems in use in the United States is projected to grow more than 135%.

[1] Other frequencies, not itinerant or nationwide must be coordinated and therefore do not have the same flexibility of use.

[2] Information derived from GPS 2005, Allied Business Intelligence, 1999

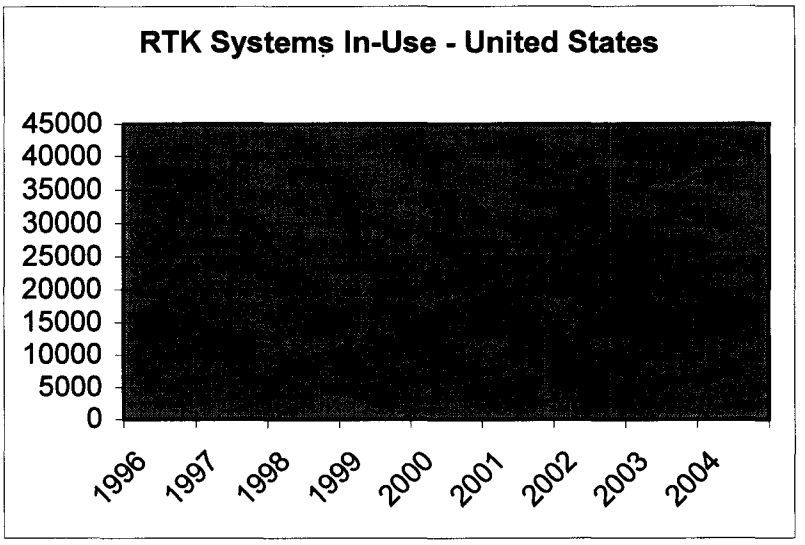


Figure 1

The Benefits of RTK Services

In addition to its obvious utility for precision land surveying activities, RTK technology is also employed in a growing number of other important applications both in the U.S. and elsewhere. RTK technology is used to design and maintain flood control facilities and measure groundwater; survey contaminated areas where traditional surveying methods would be hazardous; survey the precise location of hazardous materials; monitor the condition of bridges to measure deflection and deformation in order to assure continuing bridge safety; and to monitor crustal movements preceding earthquakes. RTK technology is also used to determine precise locations for mining explosives, measure water vapor for more accurate weather forecasting and precisely determine beachfront erosion. Thus the marriage of GPS and RTK technology has made possible precision location and measurement tasks previously not possible or requiring great expense.

The Need for Additional Radio Spectrum

As might be expected, the present secondary operation on voice priority frequencies by RTK systems is problematic, both to the primary channel licensee and the secondary RTK user. Further, given the growing applications for RTK technology, and the growing number of RTK system users, the small amount of spectrum used by the RTK industry is rapidly becoming inadequate to meet industry needs. In short, RTK technology needs, if not a home, certainly additional frequencies to meet expected demand.

Most Part 90 frequencies are not available to solve the problems unique to industries that need to transmit highly accurate positioning data on constantly varying sites. Individual site licensing would be an expensive and cumbersome process for

transitory RF activities. Part 15 operations would be for much shorter-range transmissions and even then would be burdened by duty cycle restrictions.

The Group C Proposal

The Commission's proposed Group C allocation in the instant proceeding has the great potential for providing additional spectrum that RTK technology users so desperately need for short-range applications. RTK systems use the few frequencies available for itinerant data transmission and so are already designed to take advantage of the propagation characteristics of the 450-470 MHz band. The proposed 2 watts should sufficient for many RTK applications. Non-coordinated, nationwide, itinerant use is obviously provides the flexibility for many of the growing applications of RTK technology. The only issue then is the proposal to restrict Group C use for voice applications.

The Commission explains that according to the LMCC, Group C frequencies would be used by small businesses such as electricians, plumbers, and others who need short-term, on-site communications. Pacific Crest certainly has no quarrel with a desire to provide low power voice communications to small businesses, although common experience makes plain that the Cellular and PCS industries already adequately serve the needs of this community[3]. The Commission should recognize also, however, that the very same sites where plumbers and electricians work are also sites where surveying and positioning activities also occur. The surveyors, however, must use RTK data, not voice, communications.

As noted above, Industry studies show that there is a growing need for spectrum used on a primary, uncoordinated, nationwide, itinerant basis for data transmission. The Commission has proposed 25 frequency pairs for Group C use. Pacific Crest urges the Commission to allocate a portion of these frequencies, perhaps as few as six or seven, on a primary or co-primary basis for data applications. This would serve growing needs without unduly limiting the use of most Group C frequencies for the voice transmissions originally envisioned. To ensure that the spectrum will not be used in ways unintended e.g. for continuous transmissions for internet or similar access, the Commission may wish to adopt a reasonable duty cycle. As noted, the Pacific Crest devices transmit with a 30% to 70% duty cycle, dependent on the number of satellites visible to the base station and other surveying/positioning applications should be unimpeded by similar operational constraints. Such a restriction would permit RTK or other data activities without crowding the spectrum and making it difficult for others to satisfy their spectrum requirements as well.

Pacific Crest's proposal, essentially, is along the lines of the Commission's Group B proposal --where data transmission would be on a primary, coordinated basis -- but with itinerant, non-coordinated use permitted. The activity of the surveying community and probably others requires such a modification. While the Group B proposal would

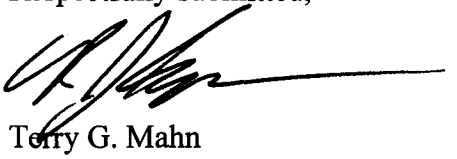
[3] Nextel directs the advertising of it's combination cellular and push-to-speak phone directly at members of the construction industry.

satisfy the needs of those who can take advantage of low power transmitters to send data transmissions from fixed locations, the Commission should understand that there is another community with the need to use low power transmitters to send data on an itinerant basis. Both groups should be served by the Commission.

Conclusion

Over the last few years, it has become apparent that wireless data activities are growing, and are expected to continue growing, exponentially. Even in the four years since the LMCC Consensus plan, there have been many new applications that would benefit from an allocation of low power channels for data transmission. The Commission has the opportunity to recognize this growing need by fashioning its final Group C standards flexibly to permit a small amount of wireless data use.[4] Whatever the importance of more spectrum for itinerant voice communications, now there is also a need for itinerant data frequencies. Pacific Crest urges the Commission to allocate six or seven of the proposed Group C frequencies for nationwide, uncoordinated, itinerant data use on a primary or co-primary basis.

Respectfully submitted,



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October 12, 2001

[4] Of course, given the rapid digitization of communications, it is likely that there will be further demands for frequencies for itinerant data transmission in the 450-470 MHz band that the instant proceeding may not be able to satisfy. Nevertheless, the Commission should take this opportunity to satisfy the needs of the industries ready to take advantage of such an allocation now.